DEVELOPMENT OF PEDAGOGICAL CONTENT KNOWLEDGE (PCK) MEASURING TOOL FOR BENGALI MEDIUM GEOGRAPHY TEACHER

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ABSTRACT

The crucial aim of teacher education is to prepare successful teachers who are capable of bringing about the required behavioural changes in students. The quality of teaching is determined by the features of teaching learning process made in the classroom condition. So the pedagogical content knowledge (PCK) of geography teachers must improve their teaching learning activity. This kind of device has not available in such condition. So the investigator decided to construct and standardize the PCK measuring tool for geography teachers. In this paper researchers describe the procedure they have attained in construction and development of a tool to measure the PCK of geography teacher, teaching in Bengali medium school in West Bengal. The final form of tool was consisted with 37 items, which are multiple types with four alternative optional feedbacks. Content validity index and reliability of the tool has made also.

KEYWORDS: Pedagogical Content Knowledge, Tool Development, Content Validity, Geography Teacher.

1. INTRODUCTION

Pedagogical Content Knowledge is commonly believed to be a transformation of at least two constituent knowledge domains: general pedagogical knowledge and subject matter knowledge (Gess-Newsome, 1999). It differs from both content knowledge and general pedagogical knowledge. Content knowledge is the knowledge of content expert, general pedagogical knowledge is the knowledge of experienced teachers, such as knowledge of how to organise a classroom and manage students during instruction (Shulman, 1986). According to Kagan (as cited in Gess-Newsome & Lederman; 1999) pedagogical content knowledge cannot be observed directly. It is partly an internal construct, teachers understanding of content specific examples that best represents specific topics, and knowledge of common student difficulties with specific topic. A difficulty also noted by him, that the assessment methodology of PCK is generally time consuming to develop, administer, and analyse. Baxter and Lederman (1999) mentioned that, the used techniques to assess PCK fall into three groups: (i) Convergent and inferential techniques, (ii) concept making, card shorts and pictorial representations, and (iii) multi-method evaluation. In this study researchers used Convergent and inferential techniques include Likert-type self-report scales, multiple choice items and short answer formats.

1.1 Need of Construction of the PCK measuring Tool:

Pedagogical content knowledge is a well known and most useful term in teacher education program. It will focus on both the dimension of teacher preparation i.e., pedagogical and content perspectives in same importance. But in case of trainees assessment concerning to pedagogical content knowledge, there was no specific tools or device to measure both the areas of teachers' knowledge. This is a general problem in our country and also in our state of West Bengal, faced in all the subjects taught in schools level. The subject Geography also continuing with same concerning to the assessment of PCK of trainee teachers and also for in-service teachers. To keep the situation in mind researchers felt to construct a measuring tool, which will emphasise all the aspects of pedagogical content knowledge of subject teachers in school level. In the process of tool development researchers always try to consider the cultural setup and practices happening in secondary schools of West Bengal.

1.2 Components of the Tool:

Components of the PCK measuring tool for geography teacher has been adopted from, Magnusson, Krajcik, & Borko (1999, p.97) i.e. (1) Orientations toward geography teaching, (2) Knowledge & beliefs about geography curriculum, (3) Knowledge & beliefs about instructional strategies for teaching Geography, (4) Knowledge & beliefs about student understanding in geography, (5) Knowledge & beliefs about assessment in geography.

(a) Orientations toward Geography teaching; this components of PCK refers to the teachers' knowledge and beliefs concerning with the purposes and goals for teaching geography at a particular class or grade level. According to Grossman, it is consisting of knowledge of the intention for teaching a particular subject on a particular stage. An orientation represents a general approach of conceptualizing geography teaching. The importance of this component is that these knowledge and beliefs provide a conceptual map that, which makes easy to decide instructional decisions about issues such as daily objectives, the contents of learner assignments, the exercise of text books and the appraisal of student learning with regard to a specific geography class.

(b) Knowledge & beliefs about Geography curriculum; this component consists of two categories; goals and objectives, and specific programs and materials.

(i) **Knowledge of Goals and Objectives:** It includes teacher knowledge of the goals and objectives for students in the subjects they are teaching, as well as the articulation of those guidelines across topic addressed during the academic session.

(ii) **Knowledge of Specific Curricular Program:** This knowledge of geography curriculum consists of knowledge of the programs and materials that are relevant to teaching a particular domain of geography and specific topic within that domain.

(c) Knowledge & beliefs about Instructional Strategies for Geography teaching; this is included of two categories: knowledge of subject specific strategies, and knowledge of topic specific strategies. Both strategies in these categories differ in respect of their possibility.

(i) **Knowledge of Subject-specific Strategies:** Subject-specific strategies are broadly related; they are specific to teaching geography as different from the other subjects. Strategies included in this category represent general approaches to or overall schemes for initial geography instruction.

(ii) **Knowledge of Topic-specific Strategies:** Topic–specific strategies are greatly narrower in scope; they concern to teaching of particular topics within a domain of geography. Topic specific strategies are useful for helping students comprehend specific geography concepts. There are two categories of this type of knowledge;

a. Topic-specific representation.
b. Topic-specific activities.

(d) Knowledge & beliefs about Students' Understanding of Geography; this component of PCK, indicates to the knowledge of geography teachers must have about students to help them expand specific geographic knowledge. It includes two groups of knowledge: (i) desires for learning specific geographic concepts, and (ii) areas of geography that learners find difficult.

(i) *Knowledge of Requirements for Learning*

(ii) *Knowledge of Areas of Student Difficulty*

(e) Knowledge & beliefs about Assessment in Geography; Tamir (cited in Magnusson et al., 1999, p. 108) proposed that, the knowledge of assessment can classify in two categories: knowledge of the dimensions of geographic learning that are significant to assess, and knowledge of the methods by which that learning be able to assess.

(i) *Knowledge of Dimensions of Geography Learning to Assess*

(ii) *Knowledge of Methods of Assessment*

2. CONSTRUCTION PROCESS

2.1 Focus Group Discussion

Geographers undertaking pedagogic research may decide to use focus groups when they need to create ideas among a group of staff for the purposes of curriculum improvement; or when they want to find out how a new policy will be accepted by staff in order to plan appropriate means of implementation (Rosanna, 2006).

A focus group discussion technique was used to get in-depth understanding of the issues under study. After the detailed consultation with the "Examining Pedagogical content knowledge" (Gess-Newsome & Lederman, 1999, Eds.), Researchers have decided to conduct a focus group discussion for the school teachers, teaching geography in Bengali medium school. Focus groups should provide participants with a satisfying learning experience of their own. Through the activity of generating and sharing ideas, participants are establishing the relevance to them of new policy, idea or issue. Careful selection of your population sample is thus important (Rosanna, 2006).

The group was homogeneous with adequate variation (i.e. location, gender, qualification and experience) to allow for divergent opinions. The composition of the focus group was consisted with 12 geography teachers (Male-6, Female- 6; Rural- 5, Urban- 7; UG- 4, PG- 8; HE- 7, LE-5). They were attained in a single sitting to share about the different components of PCK. On that discussion participants were actively enjoy the terms and their allied functions or activities they had used for instruction in classroom teaching. Researcher had try to realise their understanding and activities of geography teachers' concerning to the different components adapted from Magnusson et al. (1999).

2.2 Broad Analysis of the content in Geography

The items for PCK in geography were selected from the contents of the geography syllabus (class IX) prescribed by WBBSE. Items were consisted with theoretical and practical similarly physical and cultural aspects of geography curriculum. After a detailed analysis of the text books of the subject, such numbers of topics were chosen for the foundation of test items. Initially fifty one (51) items were constructed to emphasise on the dimension of PCK; content-specific pedagogical knowledge concerning to a context.

2.3 Experts Opinion

After identifying different dimensions of the PCK in geography against the specified content areas the investigator sought the opinions of different resources persons. Resources persons included experienced university, college and school teachers as well as teacher educators of training colleges. They were requested to comment on the adequacy of the dimensions adopted by the researcher. The test items together with dimensions of the test were placed before the three (03) resources persons. They were requested to judge: (i) language of the items, (ii) Adequacy of the items, (iii) whether the items have been drawn is relevant to the dimensions. (iv) correctness of the items, (v) whether the number of items adequately represented the different units of the content area in geography. They were requested to modify or alter the items if they think necessary. On the basis of pedagogy Experts ratings using a three point scale; 0 = not at all suitable, 1 = nearly Suitable, 2 = perfectly suitable, four (04) items were eliminated according to the degree of relevance, not at all suitable.

2.4 Test Administration on Sample

Tool has been administered individually, covering 433 samples from different districts of southern part of West Bengal. After getting the responses from samples, 17 questionnaires were rejected due to the error found in responses. Therefore, 416 responses from geography teachers (male, 243 & female, 173) were fixed for tool development. Each of every item has been provided with four multiple choice answers. One correct and others were not. With choosing of correct option, response recorded as score of '1' otherwise that was '0'. There was no time limit for the test; generally teachers took 30 to 40 minutes to complete all the items (47).

2.5 Reliability

After getting response sheet from the sample, researchers eliminated 10 items which have item total correlation either negative or less than 0.10. To test internal consistency of the items (47-10 = 37) on PCK measuring tool, chronbach's alpha used by the researchers. In this study alpha coefficient for 37 PCK item was 0.73 (Table 2), which indicates a high level of international consistency for those items (Spss faq, n.d.). which indicated a high level of internal consistency (Spss faq, n.d.) with 416 sample size (Table 1).

Table 1. Case Processing Summary

		N	%
Cases	Valid	416	100.0
	Excluded	0	.0
	Total	416	100.0

Table 2. Reliability Statistics

Cronbach's Alpha	N of Items
.725	37

2.6 Content Validity

Several methods of quantifying experts' degree of conformity the content relevance of an instrument have been mentioned. Content validity index is a systematic and two-stage process. After completing the instrument design stage, judgment on instrument items is performed and content experts study the agreement between theoretical and operational definitions. It is the most important task in the development of tool to undertaking instrument reliability and prepares a valid instrument in terms of content (Zamanzadeh, et. al., 2015). However, the present researchers used the Content Validity Index (CVI) to assess the content validity of their tool measuring pedagogical content knowledge in geography of Bengali medium teachers. According to the Polit & Beck (2006; p. 493) CVI is the level to which an instrument has a proper sample of items for construct being calculated. Lynn (1986) proposed two types CVIs, (as cited in Polit & Beck, 2006) i.e. Item level content validity index (I-CVI) and Scale level content validity index (S-CVI. Researchers' need strong theoretical and developmental effort, good items, outstanding experts, and unambiguous instructions to the experts concerning the underlying constructs and the rating duty.

Here, present researchers already dropped four items on the basis of expert comments (51- 4 = 47), which were not at all suitable commented by at least one of three subject experts. Secondly, researchers eliminated 10 items on the basis of item total correlations (47 – 10 = 37). The computed I-CVI of 37 items was 1.0, which is excellent recommended by Polit, et al., (2007, p. 467). Two separate way of computing scale level content validity index suggested by Polit & Beck (2006, p.492). Present investigators used the more liberal S-CVI/Ave than conservative S-CVI/UA. In this study S-CVI/Ave calculated according to the degree of relevance perfectly suitable only, through three separate ways and all of those techniques produced the same value, 0.77. Although Polit et al. (2007, p. 467) recommended the value of S-CVI/Ave should be 0.90 or higher.

3. DESCRIPTION OF THE FINAL TOOL

This tool made for Bengali medium Geography teachers at secondary level, considering with 416 samples, 37 MCQ items based on five components of PCK. Validation of the tool made through content validity index on both, item level (I - CVI) and scale level (S – CVI/ Ave). Reliability also computed through chronbach's alpha 0.73. The obtained scores on PCK measuring tool can also be qualitatively interpreted (Table 3) as high, moderate and low levels of PCK in geography.

Table 3. Level of PCK in Geography

Scores	Interpretations
28 and above	High
24 to 27	Moderate
23 and bellow	Low

4. CONCLUSION

The learning of the students mostly depends on their teachers. It is significant that in-service teachers who are nurturing the future citizens of India have must equip with enough pedagogical content knowledge in their subject taught. This will make their activity more effective. Such kind of PCK measuring tool was not available in our context, especially for Bengali medium geography teachers. This study may be helpful to measure geography (class IX) teachers' PCK, especially for Bengali medium school in West Bengal.

REFERENCES

1. Baxter, J. A., & Lederman, N. G. (1999). Assessment and measurement of pedagogical content knowledge. In Gess-Newsome, J., & Lederman, N. G. (Eds.), *Examining Pedagogical Content Knowledge*, (pp. 147-162). NY: Kluwer Academic Publishers.

2. Gess-Newsome, J. (1999). Pedagogical content knowledge: An introduction and orientation. In Gess-Newsome, J., & Lederman, N. G. (Eds.), *Examining Pedagogical Content Knowledge.* (pp. 3-20). NY Kluwer Academic Publishers,

3. Jeelani, B., & Kumar, R. K. (2015). Construction and Standardization of the teachers' professional ethics scale (TPES). *International Journal of Multidisciplinary Research and Modern Education* (IJMRME), 1 (1), 46-49. Retrieved from www.rdmodernresearch.org

4. Magnusson, S., Krajcik, J., & Borko, H., (1999). Nature, sources and development of pedagogical content knowledge for science teaching. In Gess-Newsome, J., & Lederman, N. G. (Eds.), *Examining Pedagogical Content Knowledge.* (pp. 95-132). NY: Kluwer Academic Publishers.

5. Polit, D. F., & Beck, C. T. (2006). The content validity index: Are you sure you know what's being reported? Critique and recommendations. *Research in Nursing and Health,* 29, 489-497. Retrieved from https://www.researchgate.net/file.PostFileLoader.html?id...assetKey...

6. Polit, D. F., Beck, C. T., & Owen, S. V., (2007). Focus on research methods is the cvi an acceptable indicator of content validity? Appraisal and recommendations. *Research in Nursing & Health,* 30. 459–467. Retrieved from file.qums.ac.ir/repository/snm/Appraisal%20and%20Recommendations%202007.pdf

7. Rosanna L. B. (2006). A practical guide to focus-group research, *Journal of Geography in Higher Education*, 30:3, 463-475, DOI: 10.1080/03098260600927575

8. Shulman, L. (1986). Knowledge and teaching: Foundation of the new reform. *Havared Educational Review*, 57(1), 1-22. Retrieved from http://www.jstor.org/journals/aera.html.

9. Spss faq, (n. d.). Retrieved from http://stas.idre.ucla.edu/spss/faq/what-does-cronbachs-alpha-mean/

10. Zamanzadeh, V., Ghahramanian, A., Rassouli, M., Abbaszadeh, A., AlaviMajd, H., & Nikanfar, A. (2015). Design and implementation content validity study: Development of an instrument for measuring patient-centered communication. *Journal of Caring Sciences,* 4(2), 165-178, doi:10.15171/jcs.2015.017